

**A PRACTICAL
TREATISE ON
THE VALUE OF
PERUVIAN AND
ICHABOE...**



TO THE AGRICULTURISTS OF THE UNITED KINGDOM.

GENTLEMEN,

On submitting to your kind perusal and consideration my sentiments, annexed with others, on the important value of genuine guano as a manure, which, if introduced generally, would unquestionably be the means of supplying the United Kingdom with the estimated annual average deficiency of one million quarters of wheat, required for the consumption of the increasing and unemployed population of Great Britain.

It is also with pleasure and gratification I state that I have been favoured with every possible facility required to accomplish the object of this treatise, as regards the necessary and important information on the subject, from the most scientific gentlemen and practical agriculturists this kingdom can produce, who, without the least hesitation, admit the national importance of husbandry as of the highest consequence to the community at large.

It is also a fact highly honourable to England, that no other country has applied the principles of science, evinced more anxiety, or has been rewarded with more successful results, in producing, in the most limited time, the greatest quantity of both animal and vegetable food, with the least possible cost, and that without permanent injury to the land generally; which is no longer doubted by any nation acquainted with the cultivation of the soil.

To effect extra crops of corn, and all productions of the soil, so very essential at the present crisis, can no longer be considered *impracticable*; and we have been indebted for a few years

back to Messrs. William James Myers and Co., and Messrs. Gibbs, Bright, and Co., of this port, alone, for the introduction of this most powerful manure. However, since the period alluded to, a discovery of genuine guano has been made at Ichaboe Island, on the western coast of Africa, from whence considerable supplies have reached this port, of indisputable and genuine quality; and, indeed, such has been the spirit for the importation of guano, that a great number of ships, within the last two months, has been fitted and sent out from this port for the same to Ichaboe Island. As the voyage cannot possibly be performed in less time than from six to seven months, the agriculturists will not benefit from them this season, but they may look forward with pleasure to a certain supply of *genuine guano* early next spring, and, what is still more cheering to them, they will be enabled to obtain the same at considerably lower prices than at the present period.

I cannot conclude my observations on the use of guano without stating that genuine guano is cheaper to the agriculturist at £15 per ton, *laid down on his farm*, than any manure or compost discovered in this generation, and, I may venture to say, will continue to be so during the next.

I beg to remark, also, that the strength of this kingdom is in its population, which chiefly consists of the industrious agricultural community, whom we are bound to assist, protect, and provide for.

I am, Gentlemen,

Your most obedient and devoted Servant,

J. H. SHEPPARD.

Liverpool, June 4th, 1844.

INTRODUCTION.

ON THE IMPORTANT VALUE OF GENUINE GUANO AS A MANURE.

GUANO having proved itself of considerable utility, in spite of immense prejudice and opposition, which all new manures or composts are subject to, a few observations may be necessary before I proceed to state its extraordinary quality and powers.

In whatever shape this powerful manure has been applied to the soil, its beneficial effects have been seen in the increase of crops generally, and in the relief it has afforded to decreasing green crops. Before, however, furnishing any proofs on the point, I may be allowed to observe, that I have followed the advice of that lamented patriarch of the soil, the late Earl of Leicester (but who, at the time I am speaking of, was Mr. Coke), and which was given to me while on a visit at Holkham, and inspecting the farms; namely, never to report any agricultural improvement or experiment until it had been fairly and impartially tried for three years, either by himself, his neighbours, or some scientific agriculturist, on whom he could fully rely. I shall now proceed to lay before my readers some of the extraordinary effects of guano, which may be fully relied upon; and, although some of them may be known already to a few individuals, I am anxious that the facts should be circulated as extensively as possible.

Statement of the comparative produce of one acre (out of five acres as an experiment) on mossy land (Chat Moss, half way between Liverpool and Manchester), manured with $2\frac{1}{2}$ cwt. of guano; and with 6 cwt. of fine sifted coal ashes, sown by the hopper broad-cast the last week in April, 1841, and 26 tons of night soil from Manchester. The land had been mown for four years previously, and was quite exhausted.

	£	s.	d.
26 tons of night soil and ashes, at 5s. 6d. per ton.....	7	3	0
$2\frac{1}{2}$ cwt. of guano, just imported, at £15 per ton	1	17	6
Difference in cost of manure	5	5	6
Extra produce of hay gained by the use of guano, 1 ton 10 cwt. per acre, at 50s. per ton.....	3	15	0
Balance per acre in favour of guano over night soil and ashes ..	9	0	6

The extra produce was not coarse in its nature; and the after-grass was nearly double that of former years, and the cattle improved astonishingly upon it.

SECOND EXPERIMENT.—On eight acres of moderately light land, I sowed 3 cwt. of guano and 3 bushels of Italian rye-grass. It was sown on the last day of April, and cut the first week in August. When cut, the produce was 18 tons of grass; when dry and ready for the stack, 4 tons per acre: and great part of the grass was 5 feet to 5 feet 3 inches long. Two days after cutting, the grass had grown at least 3 inches. With such grass, and a top dressing so easily procured, there is no reason why the poor cottager with his five roods of land should not grow his own potatoes, and furnish a cow with winter and summer food; and thus provide his family with a large proportion of what they require for subsistence.

The increase of corn crops by the use of guano is accompanied by one of equal consequence, namely, the accumulation of straw, by which the fold-yard is enriched with extra manure; and I regard it as the great secret in all agricultural operations, so to apply the manure as to produce the greatest possible benefit at the least possible cost. As bearing upon this point, I beg to suggest that the farmer should supply the land nearest his farmstead and fold-yard copiously with the extra manure, and he will have less trouble than when the roads to the more distant lands are almost impassable (from November, and through the winter, frosty weather excepted); by the use of guano, the more distant roads will be less frequented, and be kept in better condition for harvest operations.

In fact, a labouring man, with a barrow, would convey as much guano in one day to the distant lands as would be equal to the farm-yard manure, which a team and eight horses could convey in three days; that is, reckoning 9 cwt. of guano to go as far as 60 tons of the best farm yard-manure, and with certainty of a larger crop: thus combining extra produce with half the expense, and this, too, on the worst soils of the farm, when all other attempts have proved nearly fruitless.

It is also important to state, that on mossy and springy hills and valleys, where the roads and lands will not bear the weight of heavy carriage, guano, sown broad-cast, has raised average crops, while farm-yard dung and bones have been altogether useless.

IMPORTANT RULES

IN THE APPLICATION AND PREPARING OF

GUANO,

AS A MANURE FOR THE DRILL OR BROAD-CAST,

PER STATUTE ACRE.

I.

Procure genuine guano (Peruvian, or Ichaboe, Western Africa) direct from the ship, if possible, and employ a competent person to examine the same before put into bags, previous to leaving the port.

II.

If any lumps in the guano, pass them through a sieve, and repeat the same until they all disappear. Never mix slacked or unslacked lime with the guano. In case of mixing bones and guano together, for a top dressing, that only two days before applied to the earth. In preparing different soils, &c., place always a layer of the ashes, earth, or otherwise most appropriate for the guano intended to be applied, and one of guano alternately. When done, turn the whole carefully over together, and after the whole is properly mixed with a shovel, pass the same through a garden riddle, and exclude the whole from the atmospheric air, or damp situations, until taken away for use.

III.

The preparation for strong or clay soils, to be prepared two days only before committed to the earth.

IV.

The preparation for peaty, turf, mossy, or springy land, one day only.

V.

The preparation for gravelly, sand, lime, stone, or any light soils, seven to twenty-one days, as convenient.

VI.

In all cases to be applied before or after rain,* this to be effected by strictly attending to the weather glass.

VII.

PREPARATION FOR CLAY AND STRONG SOILS.

Mix wood, charcoal, or coal ashes, passed through a sieve (quite cold), peat sod, or turf ashes, if it can be procured, in preference, and sawdust, if the former cannot be readily obtained, the day before taken up for use, with as much farm-yard drainings sprinkled over the whole, and after regularly mixed together, so that they will pass readily through a garden riddle, preparatory to their immediate application to the earth, and sufficiently dry to be used with the drill, if required.

VIII.

PREPARATION OF GRAVEL, SAND, OR ANY LIGHT SOILS.

Gypsum, strong clay or marl (not calcined), earth from ditch bottoms, decomposed soils, or good black garden earth, and if not sufficiently dry, may be exposed to the sun, or open air, sufficient time as to pass through the finest mesh sieve they will admit of.

IX.

THE APRIL AND MAY TOP DRESSINGS, FOR GRAZING LAND.

Clay and strong soils, per statute acre, 3 cwt. of guano with three times its bulk of—[Rule 7.]

X.

FOR MEADOW LAND, GRAVEL, SAND, OR ANY LIGHT SOILS.

2 cwt. of guano and 2 cwt. of gypsum, or 2 cwt. of guano, and three times the bulk of—[Rule 8.]

Observe, when 4 cwt. of guano, &c. is applied to the acre, it will be better to divide that quantity, and introduce 2 cwt. of guano &c. before the land is laid down for meadow, and 2 cwt. of guano, &c. as early as possibly convenient after the grass or hay is taken from the field. Should, in any instance, a smaller or larger quantity of guano be preferred, as an experiment, in that case quantities of each, proportionately, according to the nature of the soils,

* Avoiding strong windy weather, if possible.

and after applied to the ground, in all top dressings to be immediately well rolled and bushed.

XI.

MOOR, PEATY, SPRINGY, OR MOSSY GROUNDS.

3 cwt. of Guano, with three times of its bulk of—[Rule 7.]

N.B.—All artificial grasses, clovers, to be applied same as meadow land; nature of the soil to be treated accordingly.

Although the increase of grass will be very considerable indeed, the after math and hay taken out of the field, it is not of a coarse quality, neither does it injure the crop for the following year, but it is recommended, the spring following, to apply 2 cwt. of guano, and 3 cwt. of soil, ashes, or what is properly adapted for the land, in quantity, it will increase the crop considerably earlier, and the grass and hay is of a superior quality.

But if no additional top dressings are applied at spring, or after the field is cleared of grass or hay for three years, the crops will be stronger than those manured with farm-yard dung, or bones, for manure is the mainspring in all farming and garden operations. We may drain well, subsoil, or plough deep, but, without sufficient quantity of manure, land cannot be more profitably worked than a horse can that is only half fed.

TOP DRESSING FOR WHEAT, BARLEY, AND OATS.

For April, May, and beginning of June, for all soils deficient in plant, or in a weakly state, the following application will prevent the wire worm destroying the roots (as all insects, rats and mice also, will not stay where genuine guano is near), and, in a great many instances, has destroyed the wire worm altogether, and prevented mildew.

FOR GRAVEL, SAND, AND LIGHT SOILS.

2 cwt. of guano, and 2 cwt. of gypsum, or 2 cwt. of guano, with three times the bulk of—[Rule 8.]

FOR CLAY AND STRONG LAND.

2 cwt. of guano, with three times the bulk of—[Rule 7.] The above, if applied to crops of corn, in a healthy state, will give additional increase to the same generally, quality finer, bulk of straw

greater, and earlier at maturity, than farm-yard manure, or bones, with less labour, and half the expense.

POTATOES (FOR LAND GENERALLY).

3 cwt. of guano, with three times its bulk in ashes or earth, with ten tons, or half the usual quantity of farm-yard manure, to be strewed at the bottom of the furrows, by hand, before the sets are planted; and the same will not only increase the crop one-third in quantity, but it will be earlier, quality superior, and the disease, so prevalent a few years back, will not return.

It must be particularly observed, in drilling guano, or ploughing it in, after sown broad-cast, previous to having been turned over, the depth of the furrow should be calculated, according to the nature of the soil. If cold, nearer the surface than gravel, or light soils: and to those agriculturists that have not experienced the increase, by the introduction of guano, it is advisable, to show the marked alteration, to leave a quarter of an acre of each in its original state, and to notice the difference in produce and quality, also that of farm-yard manure, and bones, if used in the same field, as an experiment.

GUANO.

It is also evident, from the trials I have witnessed, as well as from many others, the results of which have been published, that it should *not* be applied in immediate contact with the seed. If, therefore, it is applied by the drill, which I believe to be the best mode, it should be applied by a separate coulter, and by the mode adopted in the improved Suffolk drills, by which the manure is deposited in the soil so much deeper, and so much in advance of the seed, as to allow a portion of the soil to be interposed between the seed and the manure beneath it. Like all other concentrated fertilizers, it is decidedly certain that, for the most successful development of its powers, it requires a considerable supply of moisture, and will, therefore, produce the best results during wet seasons. It is used, it seems, in many situations in Peru, which are immediately afterwards irrigated. In case of crops to be produced from seed, great precaution should be observed that it does not come in direct contact with the guano, as few drop drills are calculated for the purpose.

As irrigation is so seldom available in England, that, in case of drought, a water cart (in similar construction to the common water carts used in large towns, for the streets), having the barrel or tube less perforated, and extended at each end one foot more in length, would water a considerable breadth of land, during the day, where water is in good supply, and would remunerate the farmer more than treble the cost of labour, in extra produce, besides the certainty of a crop, particularly after sowing turnips, their growth would be more rapid, consequently sooner out of the way of the flies. It might be applied to gardens and lawns, with a watering pot, and produce wonders, if the guano was made into a liquid, and where the latter has been applied, it has been attended with astonishing success; guano affords both manure, and a shower of rain, in that case, to the vegetable production.

LIQUID GUANO FOR THE FARM.

Take three pounds of genuine guano to nine gallons of rain water, let it stand twenty-four hours before applied to the soil; add to the same guano when drawn off nine gallons more of water, and should any sediment remain after again drawn away, it may be applied to the land at the rate of four cwt. per acre on clay or strong soils.

LIQUID GUANO FOR THE KITCHEN GARDEN AND HORTICULTURE GENERALLY.

Take four ounces of guano to a gallon of rain water, applied twice a week for three weeks, and particularly in hot and dry weather, to strawberry beds, onions, lettuces, leeks, &c., &c. I have several testimonials as to onions treated as now recommended, *doubling their usual size*; potatoes are six inches higher when the same application is made by sprinkling it along the rows amongst their stems; asparagus beds, cauliflowers, sea kail, &c., make very rapid progress; and it is clearly ascertained that guano destroys the wire worm—indeed, wherever it has been regularly adopted, insects of all descriptions have disappeared; it is also a great annoyance to hares and rabbits, for having watered some parsley rows with the liquid, and which were eaten down very bare by the latter, I have observed, since I applied it, they have never frequented the same again.

After a few applications of four ounces of guano to the gallon, you may double the quantity of *guano*, which, if applied to plants

in the green-house, will *flourish astonishingly*; however, it should be particularly noticed, in the first application to *green-house plants*, the liquid should commence with only four ounces to a gallon of water, and increased to eight ounces, which is better calculated for strong soil than *light earth*; and, in case of replanting, always use *common soil* (not *prepared composts*), if you intend to use guano liquid *regularly*.

MANURE AND APPLICATION OF GUANO FOR TURNIPS AND MANGEL WURZEL.

The machine used for drilling the manure and seed at the same time may be adopted, providing five times the mixture with the guano laid down in the rules of this treatise *is strictly attended to*, by which means the guano compost is deposited so much deeper and so much in advance of the seed, as to allow a portion of the soil to intervene between the seed and manure below it. *I beg to remark here, that for gravel, sand, and all light soils, 1 cwt. of gypsum with 3 to 4 times that of earth or ashes, damped with farm-yard drainings, stagnant water or thick water from a pond, in such a damp state as will freely pass through the machine or drill, will materially assist in the first stage of vegetation of the turnip, &c.*

It is highly important for turnips and rapes not to let the seed come in contact *with the guano* direct, as it will prevent the seed from germinating. The following is a copy of part of a letter from a very respectable agriculturist, received April 25th, 1844.

"I used near a ton of guano last year for my turnips, by my drill, which is on the drop principle, that is, the manure and seed are dropped together in clumps at nine-inch intervals in the rows or ridges. The guano was mixed, about a week before using, *with fine sand*, but, where it was used, the turnip seed did not come up, at least, not sufficient to stand for a crop. I had therefore to drill over again, and whenever that is the case where artificial manure, such as bones, guano, &c., is used, the second sowing of the seed does not hit upon the manure in the young stage of growth to force away the plant. I think guano is too pungent to be put in the way I had done, and yet I like the manure and seed to be near together, which made me use or adopt the drop principle. Of the ton of guano, alluded to above, I had a couple of bags left, and had it sown *broad-cast*, in October last, on newly sown wheat, and harrowed in. I have looked at it to-day, and see that part of the field is *taking the lead of the other*. I never perceived any difference till now that the wheat has begun to shoot up, which promises a most luxuriant crop."

Although this gentleman lost his turnip crop, he has not lost the guano, for its effect will be very predominant in the crop of this year. However, this is one only out of many instances where guano has been *misapplied*. I can only add, that if guano is properly attended to, there will be no disappointment as to its results except in one way—that is, it will produce more than anticipated. Genuine guano, either Peruvian or Ichaboe, Western Africa, properly attended to, will never fail in producing a good crop; and the more recently imported, and, if possible, direct from the ship, the more desirable, as it may prevent adulterations in passing through the hands of dealers, &c.

IMPORTANT TO AGRICULTURISTS.

GENUINE PERUVIAN OR ICHABOE (WESTERN AFRICA) GUANO, AS A MANURE GENERALLY.

The following results are taken from three years' impartial experiments upon an extensive scale, on soils of every description, and are selected from upwards of five hundred statements, highly attested by a portion of the most scientific agriculturists of the United Kingdom.

From the application of guano all white and green crops arrive at maturity earlier than from farm-yard manure, bones, or any other composts.

The advantage in producing turnips is of the utmost consequence to the farmer, and, by their germinating rapidly, the braide is stronger and less liable to be overtaken by the fly; and to secure early and good turnip and all other crops, is the agriculturist's surest and best groundwork.

Turnips, after the application of genuine guano, average seven to fourteen days earlier than from farm-yard manure, four to seven days before bones, and a week before that of nitrate of soda.

The following concentrated statement is an exemplification of the extra produce, as also the value of guano compared with farm-yard manure and bones; rape cake or dust is not noticed, being only fourth in the scale, compared with the former, as to produce in general.

THE PROPORTION OF GUANO, 2 TO 3 CWT., 20 TONS FARM-YARD BEST MANURE, 20 BUSHELS OF BONES
PER STATUTE ACRE.

From the use of Guano Turnips produce one-fifth more than from Farm-yard Manure and one-fourth more than Bones.

Ditto	Barley	ditto	11½ impl. bushels	ditto	6 bushels	ditto.
Ditto	Seeds	ditto	one-fifth	ditto	one-sixth	ditto.
Ditto	Oats	ditto	one fourth	ditto	one-fifth	ditto.
Ditto	Wheat	ditto	6 bushels	ditto	4 bushels	ditto.
Ditto	Straw	ditto	9 dozen of 84 lbs.	ditto	6 doz. of 84 lbs.	ditto.
Ditto	Grass & Clovers do.	one-fourth	ditto	ditto	one-fifth	ditto.
Ditto	Hay	ditto	one-third	ditto	one-sixth	ditto.
Ditto	After-math (or grass) do.	nearly double	ditto	ditto	one-fourth	ditto.
Ditto	Potatoes	ditto	one-sixth	ditto	one-eighth	ditto.
Half Guano and half Farm-yard Dung	one-half	ditto	ditto	ditto	one-eighth	ditto.

The superiority, in quality, of all crops, is fully admitted, not only in the statements alluded to in p. 10, but also from innumerable results reported to the *Royal Agricultural Society of England*, and other highly attested accounts to be found in the *Farmer's Magazine*, and other important publications of the present day; also admitting its duration, compared with farm-yard manure, and bones, is decidedly quite equal, *and that without permanent injury to the land.*

It must be particularly noticed, that where guano was applied to the different soils, and did not prove successful, in all cases it is ascertained to be from a misapplication, and introducing *what was purchased at a reduced rate—spurious guano*—in fact, NO GUANO AT ALL; and the purport of this treatise is to lay down proper rules of management, and those collected from the highest agricultural authorities in England and Scotland. But all observations on the important value of guano—the most portable and powerful manure hitherto discovered—will avail nothing, unless *genuine* guano is procured; and that I most strongly recommend to be obtained, if practicable, from the importers direct, ex ship, or through their agents or brokers, as the latter, in the port of Liverpool, transact the business of the merchant, when a cargo is divided for sale, and which is done generally to accommodate the public, and that more particularly in this port than in any other, which receives more supplies direct than all the other ports of the United Kingdom collectively.

ANNUAL DINNER OF THE MAIDSTONE FARMERS' CLUB.

The Vice-Chairman, Mr. Barnes, stated that he had prepared for turnips a piece of five acres, of poor stiff clay, which would otherwise have, in the usual round, lain fallow, with five different manures, of nearly equal value, and put on the same day and under exactly the same circumstances. He first under-drained the whole five deep, with tiles, and wood on the tiles. He next ploughed it up and down, using the mole plough every fifth time. After ploughing it once he allowed the frosts to pulverize the surface,

and at the proper time worked down the furrow, and got a fine season. I have thrown the result into the following tabular form :—

Manure.	Produce
Eight cwt. <i>guano</i> , at 12s. 6d.	640 ,,
Forty bushels ground bones, cost £5 at Maidstone	480 ,,
Ninety cart-loads of dung, per statute acre	300 imperial bushels

The whole was sowed and harrowed in the same day. Mr. Barnes said he had little doubt, if it had not been for the mildew, the crop would have been very heavy. Dung, he thought, was decidedly the best manure for the farmer, if it could be got in sufficient quantity, but he was persuaded that no quantity of dung would have produced the same results as the *guano*. To show the value of knowledge, he had been calculating what he should have gained on this one piece of five acres, if he had known last year what he did now, and used *guano* for the whole ; and he found that the four acres would have produced £30 more than they did, and at the same expense. It would have been £30 in his pocket to have known twelve months since what he knew now.

Report made to the Highland and Agricultural Society of Scotland, at their Monthly Meeting in the Museum, Edinburgh, on Wednesday, 5th April, 1843, by JOHN DUDGEON, Esq., Spyllaw, near Kelso, and read by Mr. STEPHENS.

The object of the experiments was to ascertain the value of *guano* as compared with some other kinds of manure, and so satisfied is the author with the fertilizing power of that substance, that he has made arrangements to have, this season, upwards of 60 acres of turnip land prepared with it alone. The comparative trials were made in three different fields, the conditions being varied in each. The first experiment was in a field lying upon a slope, with a southern exposure, the soil consisting of a good loam upon a retentive subsoil ; the upper part of the field, for about a fourth of its length, gradually becoming shallower in soil, and resting upon a hard muirland pan, so that the value of the lower portion of the field, as compared with the upper, may be estimated as three to one. This field has been but imperfectly drained. It was dunged in the usual way, immediately before sowing, with well-prepared

farm-yard manure, at the rate of about 18 cubic yards to the acre, with the exception of that portion to which guano was applied. Two ordinary drills for the latter were selected at random, and the guano distributed in them by the hand, without any mixture, at the rate of 3 cwt. per acre. Leaving an interval of three drills, which were manured like the rest of the field, two other drills were treated with guano at the rate of 4 cwt. per acre; and finally, with a similar space intervening, two drills with guano at the rate of fully more than 5 cwt. per acre. No difference appeared in the turnips (which were the variety named Dale's Hybrid) previous to singling, or thinning the plants with the hoe; after that, however, the superiority of the drills with the guano became manifest, and continued to increase with the growth of the turnips, particularly in those drills which received the greatest quantity, till the whole were carted off in October, when the produce (topped and rooted) of the whole six drills were weighed, each two, as differing in the quantity of guano applied, compared with two drills immediately adjoining, on which the farm-yard manure had been used. The following was the result:—

Two drills with <i>Guano</i> , 5 cwt. per acre 25 cwt. 5 st.					
Do.	Dung, 18 yds.	do.	18	„	7 „
Do.	<i>Guano</i> , 4 cwt.	do.	22	„	6 „
Do.	Dung, 18 yds.	do.	19	„	7 „
Do.	<i>Guano</i> , 3 cwt.	do.	20	„	6 „
Do.	Dung, 18 yds.	do.	19	„	2 „

In the second experiment, a comparative trial was made between guano and bone-dust mixed with coal ashes. The ashes were sifted, and intimately mixed with the bones some days before being applied, in the proportion of 16 bushels of bones and 8 of ashes, per acre. The quantity of guano applied was at the rate of 3 cwt. per acre upon 4 drills, two and two together, at an interval of eight drills manured with bones and ashes. Then, at a similar interval, followed two drills operated upon with guano, together with sulphate of soda (Glauber salts), at the rate of 4 cwt. per acre, being the only instance in the course of these experiments in which any foreign substance was used with the guano. The turnips were drawn about the end of November, and on a comparison of the weight of the crop on two of the four drills done with guano alone,

with the produce of the average of four drills, nearly immediately adjoining, manured with bone-dust and ashes, the result stood thus (the plants being topped and rooted) :—

<i>Guano</i>	23 cwt. 2 st.
Bone-dust, &c.	19 „ 2 „
<i>Guano</i> and Sulphate of Soda..	23 „ 0 „

In the third experiment guano was used against bone-dust alone, applied, as is usual in that district, at the rate of 16 bushels per acre. The guano was used at the rate of 2 cwt. only per acre. The drills manured with the latter showed a very early superiority, and were ready for the hoe fully eight days earlier than the rest of the field. This more vigorous growth they maintained throughout, and when the turnips (the white stone globe variety) were weighed on the 22nd March, after standing throughout the winter, the result was as follows (the roots and tops being in this instance retained) :—

2 drills <i>Guano</i>	31 cwt. 4 st.
2 ditto Bone-dust .	24 „ 7 „

Mr. Dudgeon mentions that he has applied guano as a top-dressing to winter wheat after potatoes, and that the ridges which were thus treated are now showing a decided superiority to the others; and in contradistinction to that first *rush* of vegetation which follows upon the use of nitrate of soda, it is only of late that the guano has exhibited its effects, though applied with the seed in October. From all that he has seen, Mr. Dudgeon is of opinion that the effects of guano will not be so evanescent as some suppose, but that it will impart a benefit to the soil of considerable permanency. He had the gratification of showing the effects of some of his experiments to Professor Liebig, who seemed much delighted with the style of their operation, and declared that no experiments could be more accurately and fairly performed, even in the laboratory.—Dr. Traill made a few remarks on the production and probable endurance of the supply of this valuable manure.

P.S.—Since the above paper was read at the Museum Meeting of the Highland and Agricultural Society, the subject to which it relates may be said to have lost much of its novelty and primary interest, many having this season obtained for themselves ocular demonstration of the transcendent effects of guano in the growth of turnips. A number of these trials—and perhaps beyond the

limits of his own district—the reporter has reason to believe were undertaken in consequence of the abstract of the report given in the newspapers at the time of the Museum Meeting, at which it was read, took place; and he may now mention that, acting upon that thorough confidence in the result of his experiments which he felt warranted him in so strongly recommending guano to the attention of his fellow-agriculturists, he has this season grown upwards of 70 acres of turnips with this manure—applied in the drill by the hand, at the rate generally of 3 cwt. per acre, without any other mixture—and he presumes he may safely challenge Scotland to exhibit a better crop, of the same extent, upon similar land produced by any other means.

Spylaw, 5th September, 1843.

Results taken from “Suggestions and Experiments in Practical Agriculture, by James F. W. Johnson, M.A., F.R.S., L. and E., &c.,” and refer to experiments on the farm at Barrochan, near Paisley, under the superintendence of Mr. Fleming. It may here be noticed, that in a communication recently addressed to Mr. Collingham, by the Hon. A. L. Melville, of Branston Hall, near Lincoln, allusion is thus briefly made to some more recent experiments:—“I hear from my brother that Mr. Fleming, of Barrochan, Renfrewshire, has this year, for the third time, found the most beneficial effects from the use of guano. He has published the result of some former experiments (on Swede turnips), and his account of them may be thoroughly relied on.

“November 16th, 1843.”

The following statement is calculated for guano at the price of 25s. per cwt.; but the cost of this manure may now be estimated at from 12s. per cwt, and less than one-half the former cost.

REMARKS.—The land is a light loam, loose in texture, and of a light brown colour, Subsoil hard, and full of small stones; it is of as nearly as possible the same quality. The turnip seed was all sown upon the same day. Rain came on the night after sowing, and in consequence the crops braided well, and came away strong. Those which show the greatest weight kept the lead of the others all the season.

Among the other experiments upon turnips here stated, those upon guano are the most practically successful. Thus, without any farm-yard manure —

Per Acre.	Tons.	Cwt. per Acre.
5 cwt. guano alone	32	15 of White Globes.
5 cwt. guano, with 20 bushels of wood ashes }	32	2 of Early Yellow.
3½ cwt. guano alone	28	0 of Purple-topped Yellow.
3 cwt. of guano alone gave	23	8 of Swedes.
3½ cwt. ditto	20	0 of Yellow and White mixed.

REMARKS ON THE THREE PRECEDING EXPERIMENTS.

In these experiments, a striking contrast is presented between the effects of rape-dust and those of guano. 16 cwt. per acre of the former gave only 3½ tons of turnip bulbs, while 2 cwt. per acre of the latter gave 5 tons. It appears, therefore, that *rape-dust requires moist weather or occasional rains, while guano, even in very dry seasons, will produce a considerable effect.*

These results are very gratifying, since they seem to show that for the turnip crop this light and portable manure may be substituted with safety for farm-yard dung. But they are more gratifying in connexion with the large reduction which has lately taken place in the price of this substance. In none of the cases above mentioned did the quantity applied exceed 5 cwt. per acre. This quantity may now be purchased for three pounds, or £12 per ton, though, when these experiments were undertaken, it cost £6 5s., or £25 per ton.

RESULTS OF ITS APPLICATION IN AYRSHIRE.

(From the *Ayr Observer*.)

We, some time since, indulged in a few remarks suggested by a short drive in the vicinity of St. Evox, where we were shown several fields of turnips, portions of which had been manured with guano, either in a pure or mixed state. The crop belonging to Mr. Skinner, at Auchincruive, as we formerly remarked, was amongst the best, if not the very best, we had anywhere seen this year. Those sown with guano were evidently superior to those grown with farm-yard manure, though both were excellent.

At Highfield, the crop of turnips, as a whole, was inferior; the rows where soot had been applied were comparatively a failure. This may have been owing to the peculiar drought of the season.

Bone-dust, as usual, had done well, but not equal to the guano ; the difference was not perhaps so much observable in the size of the bulb as in its solidity and compactness of shape. Both Mr. Skinner and Mr. Henry remarked that the guano-manured turnips came away in the greatest luxuriance at first—a circumstance of much advantage in the cultivation of a crop so dependent on its early nourishment as turnips. Unless well supplied with food at the outset of its growth, the bulb rarely attains that healthy condition so essential to its maturity ; hence the peculiar adaption of guano to turnips was not limited to green cropping. On a portion of a field which had been previously in turnip, where the bulbs were so indifferent that he caused them to be lifted in place of being “eaten off,” he sowed about one and a half cwt. of guano along with barley. The effect soon became visible in the very superior colour and strength of the braird, compared with the other and more fruitful portion of the field ; while the return surpassed his highest expectations.

Without pursuing our own observations further, we shall take a hurried glance at the contents of a number of letters which have been kindly forwarded to us by our agricultural friends, detailing the results of the guano experiments as follows :—

1. Mr. Jamieson, Newhouse, Kilbirnie, tried five cwt. of guano, mixed with thirty bushels of bone-dust, on about two imperial acres, sown with Aberdeen yellow bullock turnip. He also planted about half an acre, manured with common dung. Those with guano had the start, and in four weeks from the time they braired, appeared as if they had been sown at least two weeks earlier than the other. The produce of the former was about twenty-five tons an acre—of the latter not much above fifteen. The soil was a heavy loam ; but Mr. Jamieson thinks it would do much better on a light soil.

2. Mr. Russell, Ashmark, Cumnock, tried guano at the rate of 3 cwt., together with 16 to 18 yards of dung per acre. This was applied to the worst part of the field, yet the crop far exceeded that on the other portion of it, which had been manured with good farm-yard dung, at the rate of 60 yards per acre. The guano turnip appeared much fresher, and withstood the effects of the dry season much better. The bulbs in a row, left, by way of trial, without any guano, were deficient at least two-thirds in bulk.

3. Mr. McGeoch, Creus, Wigtonshire, writes that he applied guano in the drills, both on hard and soft land, at the rate of 3 cwt. per Scotch acre. The turnips to which it was applied were about a fortnight sooner ready to hoe than those grown with bones, and about a week earlier than those with dung. The crop, as a whole, was rather above an average. The early sown, on the hard land especially, suffered considerably from mildew, though they latterly recovered, and by the end of November looked as fresh as ever. The largest of the Swedish turnips measured 28 inches in circumference.

4. From Doonbank, Mr. McCreath writes, that he tried guano at the rate of 4 cwt. per acre, both upon a clay soil, and upon a good holm land. The crop of turnips—Dale's hybrid, and purple-topped Swedish—was equal to where he applied 20 bushels of bones, and from 20 to 25 tons farm-yard manure, per acre. The plants appeared rather sickly at first, but after being singled, they soon assumed a darker and fresher colour.

5. Mr. Henrie, East Mains, Kilbirnie, was most successful in his trial of guano as a manure for turnips. He applied about 5 cwt., in drills, to the Scotch acre; and from the first crop "made more rapid progress by a great deal than those that were manured with farm-yard dung." It was, at the same time, by far the bulkiest.

6. Mr. Kennedy, Myremill, made more than one experiment with guano. He applied, in one field, 3 cwt. mixed with 15 bushels of ashes to the acre of Swedish turnips. The plants came away freely at first, and the crop proved excellent. Another field of heavier land, for soft turnips, he manured with 18 to 20 tons of dung, and 1½ cwt. of guano, sown on the back of the drill. This plan succeeded well. A portion of the guano, however, which he sowed on the top of the dung, did not show any beneficial result.

7. Mr. Tennant, of Grenan, was very successful in his application of guano: he sowed it in drills, on land which he considered to have been previously half-manured with sea-weed, at the rate of 3 cwt. to the acre. "The turnips (Swedish)," we use Mr. Tennant's own words, "were the most luxuriant on the farm, and continued so throughout."

8. Mr. Fulton, Jameston, writing on the 15th June last, says — “It would be worth your while to come this length, or send some person, to see the marked difference of guano over all other composts.”

9. W. Niven, Esq., of Kirkbride, applied, on three Scotch acres of land, about four and a quarter cwt. of guano, with seventy-two yards of dung. The crop of turnips was excellent, equal in quantity to the best he had ever had with forty square yards of farm-yard manure to the acre.

10. Mr. Jack, overseer of the Lord Justice-General, supplies us with several extracts from his home farm book, by which it appears that the crop of turnips raised from a mixture of guano and farm-yard manure, at a rate of $2\frac{1}{2}$ cwt. of the former, and 16 carts of the latter, was decidedly the best. He had tried guano and ashes, nitrate of soda, bone-dust, &c.

From the testimony thus adduced, it must be admitted that the trial of guano last year in Ayrshire has been, as a whole, most successful. That it is particularly suitable for turnips seems to be generally allowed; and still more so when mixed with farm-yard manure, or a small quantity of bones. It is, we think, equally answerable for all descriptions of green-cropping and even grain. We agree also with Mr. Jack in thinking that guano, along with a slight mixture of soil ashes, or, in other words, the ashes of weeds, is an excellent manure for moss land. The facility with which it can be conveyed over a soft surface, compared with common manure, is a great recommendation. The most approved mode of applying guano, in turnip culture, seems to be in the drill.

The reduced prices at which this valuable manure can now be had will tend greatly to its extended use. Purchasers, however, would do well to guard against imposition, as we have the best authority for stating that adulteration is much practised by dealers.

To the Editor of the Mark Lane Express.

SIR,—If you think the following observations on guano, crops, Scotch farming, &c., worthy of a place in your valuable paper, you may at pleasure insert them :—

One acre of yellow bullock turnip, manured with 4 cwt. of guano mixed with an equal quantity of gypsum, produced a crop

of 30 tons ; one acre done with 2 cwt. of guano mixed, produced 27 tons. The portion done with the 4 cwt. pushed at first a rapid growth into the tops, so that for a long time that done with the 2 cwt. bade fair for the best crop ; but when the tops of the first portion began to fail, they shot past the other, and took their place in degree of crop. Along with all my turnips I sow 1 cwt. of gypsum per acre, mixed with a like quantity of wood or other ashes, in such a damp or wet state as will pass freely through the machine, which greatly assists in the first stage of vegetation.

On no account would I sow such manures as guano, &c., upon the surface for a turnip crop, which is too commonly done by machines for the purpose. Although those machines have coulters making ruts of two or three inches deep for receiving the seed and manure, yet the depositing of that manure so near the surface induces the plant in seeking food to push its roots along the top of the drill, thereby exposing them to all the changes of our variable climate, and materially checking the growth of the plant. Another evil attending sowing manure on the top of the drill is, that in the first hoeing or thinning of the turnips, a large portion of such manure is drawn away from the plant altogether. The manure for a turnip crop ought to be deposited in the bottom of the drills, and then covered in about six inches deep, the seed then sown on the top of the drills along with the before-mentioned mixture, the plants will then push their roots in the natural direction, where they will find their food in a comparatively uniform temperature.

I enclose you a hand-bill which Mr. Brocklebank's manager had printed for circulation amongst his friends some time ago. In the first experiment it was found that 4 cwt. of guano produced as good a crop of turnips as 25 tons of farm-yard manure. The cost of the guano may be taken on the spot at 50s. as the extreme, whilst the manure cannot be valued at less than £12 10s.

I would procure my turnips with the aid of 3 cwt. (4 cwt. causes them to be too gross, and on that account not to keep well) guano, to be eaten off by sheep or drawn ; and I would, again, use 2 cwt. guano on sowing the barley, with which crop I would again lay the land to grass.

This system, I believe, from my experience, may be profitably followed, and the land be left in good condition ; but it is evident

from what I have detailed of the relative cost of guano and manure, that without the introduction of the former it would have been impracticable. It must not be forgotten that the use of guano, by increasing the produce to be consumed on the farm, increases the farm-yard manure. I repeat, the introduction of guano has added materially to the value of many estates.

I remain, dear Sirs,

very truly yours,

THOMAS FISHER.

QUANTITY OF GUANO TO BE APPLIED FOR A
STATUTE ACRE OF LAND.

For Wheat	3 cwt. weight.
„ Barley	2 „ „
„ Oats	2 „ „
„ Turnips.....	3 „ „
„ Carrots	4 „ „
„ Pasture Land	3 „ „
„ Hay Ground	3 „ „

N.B.—The author particularly recommends, in preference to applying 3 cwt. of guano to hay ground in the spring, that 2 cwt. should be applied on laying down of the meadow, and 2 cwt. immediately after the hay is taken away from the field, as soon after as the weather-glass indicates rain.

BARLEY.

From the numerous experiments which have been made with different manures in various parts of the kingdom, on almost every variety of soil and situation, it is reasonable to hope that by a comparison of the results obtained by these means, we may arrive at something near the truth, and be enabled to form an estimate of the relative value of the substances that may have been made the subject of investigation. It is with the view of assisting in this important work, that I have received the permission of Sir Charles Lemon, Bart, M.P., to transmit you the following details of some experiments made at Carclew, in 1843, for the purpose of testing, on a small scale, the merits of certain manures, when applied as a top-dressing to growing crops; and although they are far too limited in extent for us to draw any positive conclusions from them, as to the real value or inefficiency of either of the substances employed, they will probably be useful in some degree as exhibiting their fertilizing powers under circumstances precisely similar in every respect.

The subjects selected for experiment were, 1st, nitrate of soda; 2nd, guano; and 3rd, drainings from the farm-yard. The field

considered as the most suitable for giving the whole a fair trial, was one with a high open exposure sloping to the south, where the soil is a free light loam, averaging about a foot in depth, on a yellow clayey subsoil, interspersed with spar. It had been well manured the previous season, and cropped with turnips. After these were removed, the ground was ploughed and prepared for barley, which was sown in the latter part of April. On the 15th May the manures were applied, the tenth part of an acre being allotted for each experiment. [After some remarks on the other manures, Mr. Booth proceeds thus:]—

Guano.—The conflicting statements which have appeared from time to time respecting the proper quantity which ought to be applied of this manure, and the failures that have occurred from using it too bountifully, induced me to use a much smaller proportion of it than is now recommended; but, notwithstanding this, its effects were truly remarkable; for, although only 16 $\frac{1}{2}$ lbs. were sown dry over this allotment, which is at the rate of about 1 $\frac{1}{2}$ cwt. per acre, it could readily be distinguished during the growing season from any other part of the field. The corn tillered well, and appeared thicker than in No. 1, and although somewhat shorter, it was in other respects equally strong and healthy, and of a rich deep green. It deserves to be noticed that, at the time of binding up the corn, the workmen remarked what appeared to them to be a difference in the weight of the sheaves, compared with those in the first and second plots, which they had previously bound up, and the result showed an increase over the nitrate of soda, of no less than 81 lbs. of straw, and 74 lbs. of corn; the weight of the straw being 280 lbs., of corn, 252 lbs.; equal to 5 bushels, or 50 bushels per acre. Besides this experiment, I have made several others with guano in a liquid state, on vegetables in the kitchen garden, all of which have satisfied me that this manure, when unadulterated, is one of the most powerful that can be employed for gardening purposes. Its effects are visible in the course of eight or ten days after its application. For onions, celery, and the cabbage tribe, it surpasses anything of the kind I ever witnessed. I had portions of each of those vegetables watered with guano, without being made aware of the particular spots so treated, and at the end of a week I had no difficulty in pointing out every one of them where the guano had been used.

The subjoined table will readily show the results of the several experiments :—

TABLE.
Showing the result of Experiments with different Manures applied
as a top-dressing to Barley, 1843.

Kind of Manure.	Quantity used on one-tenth of an Acre.	Price.	Produce of one-tenth of an Acre.			Cost per Acre.	Rate of Produce per Acre.	
			Straw.	Corn.	Bushels.		Straw.	Corn.
	lbs.	s. d.	lbs.	lbs.		£ s. d.	cwt. qr. lb.	bu.
Nothing	..	..	233	200	4	..	20 3 6	40
Nitrate of Soda . . .	33½	6 0	199	178	3¾	3 0 0	17 3 2	37½
	gals.							
Draining of Farm-yards .	100	..	300	256	5½	..	26 3 4	52½
Guano	16½	2 0	280	252	5	1 0 0	25 0 0	50

W. B. Booth, Carlew, 25th November, 1843.

GUERNSEY ROYAL AGRICULTURAL SOCIETY,
NOVEMBER 22, 1843.

(From the Farmer's Journal of Dec. 4, 1843.)

Mr. James Thouarc, one of the Secretaries, said,—“ Having this season tried the guano manure, I shall give you in a few words my experience of its use. Independent of its value as a most powerful manure, it is a great enemy to the wire-worm, which vermin on some lands is quite a scourge. I rent a field belonging to Government, in which I sowed 16 vergées of wheat last December; being fearful of the wire-worm, I had spread over the land, at the time of seeding, a mixture of 5 bushels of salt, and 10 bushels of soot per vergée (about two-fifths of an acre). In the same field, in the month of February, I sowed two vergées of oats, with the same allowance of salt and soot. Both crops did exceedingly well, and were very promising, till the 20th of March, when from that time to the 1st of April (10 days) the whole of the 16 vergées of wheat disappeared and were destroyed. On examination I found that the whole had been cut within an inch of the surface by the wire-worm, thereby proving that salt and soot cannot destroy this vermin. I also, the year before, tried lime for the same purpose, but it was quite useless. About the middle of April, I perceived that the two vergées of oats were quickly sharing the same fate,

when, on complaining one evening to a friend of my misfortunes, he advised me to try guano. I immediately procured guano, 1 cwt. of which I had mixed with 2 bushels of varech (sea-weed ashes, or ashes), kelp, and sown over ther the piece. From that day the oats recovered; and although there was not more than one-third of the plant left when the guano was applied, it throve so luxuriantly that it soon covered the ground, and, in the end, produced me a very fine crop, both as to quality and quantity. I have been unable to ascertain if the guano killed the wire-worm; but this I know, if it did not destroy it, it drove it away out of the reach of the roots. As to the value of guano as a manure, I have only to refer you to an extract from Sir Robert Peel's speech at Tainworth, which appeared in last Thursday's *Star*. He says—'The stable manure gave a proportionate return of 9 bushels of potatoes; Potter's manure 11 bushels; and guano 15 bushels.' The produce with the latter exceeded 600 bushels per acre, equal to 6 bushels per perch, or 240 per Guernsey vergee; an enormous crop, when considered that it was raised at the cost only of 12s. for manure."

EXPERIMENTS WITH MANURES.

*Extract from the Gardener's Agricultural Gazette,
May 25th, 1844.*

We have in the two following experiments a decided proof of the superiority of bone and guano as fertilizers, compared with dung:—Experiment No. 1.—A trial between bone-dust and Truro scavengers' dung, by Mr. George Mason, on Roseveth farm, in Kenwyn, on a crop of white turnips, calculating the price of the dung at 4s. per load—the increased consumption of bone and guano having very materially lessened the use of this article, and consequently its price.

<i>Dung, half-acre.</i>			<i>Bone, half-acre.</i>		
	£	s. d.		£	s. d.
15 loads of dung from			1½ qrs. of bone-dust	1	14 6
Truro, at 4s. per load	3	0 0	Carriage of ditto	0	1 6
Expense of carriage 3			Broad-casting, &c.	0	1 0
miles	1	17 6			
Expense of spreading the					
dung on the land	0	15 0			
	£5	12 6		£1	17 0

The crop was equal, being about twenty tons to the acre ; but the difference in the expense was so considerable that the farmer could have cultivated three acres with bone at the expense of one with Truro town-dung. The estate is situated in a poor district, having a south-east aspect and lies on the clay-slate ; valued about 18s. per acre.

Experiment No. 2.—Between dung, bone, and guano, as fertilizers for grass and hay, was instituted on land farmed by the Earl of Falmouth, in the present year, by Mr. Rope, upon a piece of permanent pasture, which had not been ploughed up for fifty years. The field had alternately been mown and grazed during this period, and had received no dressing, in the shape of dung, for the last ten years. The soil is a heavy loam, resting on a clay-slate subsoil, having a northern aspect. Three half-acres were carefully selected, measured, and manured, on the 24th of March—the hay cut on the 10th July, and weighed on the 15th. The result will be seen in the following table :—

Manures per half acre statute.	Cost of manures, including carriage.	Weight of new hay per statute acre.	Value of hay at 30s. per ton.	Profit.	Loss.
	£ s. d.	tons. cwt.s. qrs. lbs.	£ s. d.	£ s. d.	£ s. d.
15 loads of Plymouth dung . . .	4 8 0	1 8 0 0	2 2 0	..	2 6 0
10 bushels bone-dust	1 12 0	1 2 2 0	1 13 9	..	0 1 9
134 lbs. of guano ..	0 17 0	1 12 3 0	2 9 0	1 12 0	..

Here we have a decided loss on the part of the Plymouth dung, which consists of the sweepings of Plymouth streets, night-soil, rubbish, &c., of £2 6s., and a decided gain on the guano of £1 12s. per half acre. There cannot be a question after this and the other experiments which I have related, that guano is a most astonishing fertilizer ; still this experiment, valuable as it is, is incomplete, till we see the effect of these manures on the next year's crop, which should be grown without manure, and cut and saved in the same careful manner. The after grass was very good on each of the pieces, the cattle preferring the part manured with bone. Mr. Rope tried the guano in various ways. On a piece of ground adjoining, he sowed double the former quantity per acre ; and on some

young clover also a similar quantity, and the rapid growth of each was extraordinary. The spots where guano was applied could be distinguished at a great distance. In another instance he dressed half an acre of barley, with which fifteen sorts of grass-seeds, and three of clover, had been sown, and at the present period they are looking remarkably well; there was also an increase of about eight imperial bushels of barley per acre, compared with other parts of the field. I mention this circumstance connected with the seeds, in consequence of its having been stated that guano is injurious to clover and young grasses. The next experiment to which I would direct your attention, was a trial between bone and guano, also made by Mr. Rope, of Tregothnan. Upon a field of five acres in Swede turnips, which was of a very inferior description, valued at 10s. per acre, a mixture of 15 loads of farm-yard dung, and 5 loads of calcareous sea-sand (the coralline deposit found in Falmouth harbour), and 22 loads of soil taken from the ditches, was laid per statute acre, at a cost, including carriage and spreading, &c., of £4 2s. Three acres dressed in this manner were measured out—one of them having $2\frac{1}{2}$ cwt. of guano, and another $2\frac{1}{2}$ quarters bone-dust extra. The seed was of the purple-top variety, and was drilled in at 18 inches distance, on the 15th of June. The difference between the acre which was simply dressed with the dung, sand, and earth, compared with the two acres dressed with bone and guano, was as follows:—

Manures.	Value of manures per acre.	Weight of crop per acre.	Value of crop per acre, at 8s. per ton.	Difference between crop and manures	
				Profit.	Loss.
Dung, sand, &c.	£ s. d. 4 2 0	7 tons.	£ s. d. 2 16 0	£ s. d.	£ s. d. 1 6 0
Dung, sand, &c.	4 2 0				
$2\frac{1}{2}$ cwt guano	1 14 0				
	5 16 0	22 tons.	8 16 0	3 0 0	
Dung, sand, &c.	4 2 0				
$2\frac{1}{2}$ qrs. bone.	3 0 6				
	7 2 6	25 tons.	10 0 0	2 17 6	

In this experiment, the advantage is decidedly in favour of bones, since there cannot be a doubt that the next crop will derive

a much greater benefit from them than from the guano. This experiment is chiefly valuable in proving that had it not been for the outlay in these manures, the crop would never have paid for the dung and sand. The next experiment was also a trial between bone and guano, giving the advantage to the latter. It was made by Mr. C. Parks, of Michell. The field was a wheat stubble manured for that crop with a compost of dung, earth, and sand. When put into turnips, one part was manured with bone-dust at the rate of 3 quarters per acre, the other part with guano at the rate of 2½ cwt. per acre. The following calculation was made by selecting an average statute yard of turnips grown with each of these manures, and the result was as follows :—

Manures.	Cost of manures per acre.	Produce per acre.	Value of crop at 8s. per ton.	Difference between crop and manures.
	£ s. d.	Ton. cwt. qrs. lb.	£ s. d.	£ s. d.
3 qrs. bone ..	3 12 0	15 4 1 4	6 1 6	2 9 6
2½ cwt. guano	1 10 0	21 15 2 24	8 14 3	7 4 3

I have made as few remarks as possible on the effect of the different manures which we have passed in review, leaving the experiments to speak for themselves; but in this last one, it must be understood that the land was of a heavy loamy character, which is more suitable to the use of guano than bones. The next experiment was one between bone-dust, Peruvian guano, Potter's artificial guano, and bone-dust and Peruvian guano mixed, instituted on a crop of Swedes, on Trelowarren estate, by Mr. Foot, the hind of Sir R. R. Vyvyan, Bart. The land is of a loamy description on a clay-slate subsoil, having a north-west aspect :—

Kinds of manures.	Quantity of manures, per acre.	Price of manures, per acre.	Weight of Turnips per statute acre.	Price at 8s. per ton of crop per statute acre.	Difference between prices of manure and crop.
		£ s. d.	tons. cwt.	£ s. d.	£ s. d.
Bone-dust	2½ qrs.	2 12 6	23 8	9 7 3	6 14 9
Peruvian guano ..	350 lbs.	2 2 0	25 .	10 0 0	7 18 0
Potter's guano ...	350 lbs.	2 9 0	22 .	8 16 0	6 7 0
Bone-dust and .. {	1½ qrs.	1 6 3	} 26 .	10 8 0	8 0 9
Peruvian guano {	175 lbs.	1 1 0			

From this experiment we see that the bone-dust and guano mixed, gave the heaviest crop, and yielded the largest profit per acre.

ON THE TURNIP-FLY.

Some years ago I farmed some uninclosed lands, and having a somewhat speculative neighbour having portions in the same open field, we occasionally tried experiments conjointly, the intermixture of these common lands being in some degree favourable for such practices. After reading most of the "infallible remedies" of the day for securing the turnip-crop from the ravages of the fly, we each selected one of two experiments for one season's trial. My friend's choice was a mixture of some other seeds of earlier vegetation than turnip-seed, that the fly might have its fill and pass into its change before the turnips came up; a portion of radish-seed was accordingly mixed with the turnip-seed, which certainly came up first, but, contrary to expectation, the enemy left the radishes untouched, but finished off every plant of the turnip-crop, according to the regular practice. This left plenty of room for the radishes to grow, and they produced a very abundant supply for the whole parish. My experiment was a more expensive and laborious exploit: we had been reading Sir John Sinclair's method, which was to burn the land previous to sowing the seed, thereby destroying the grub or chrysalis containing the turnip beetle in its embryo state. There is but one objection to this system, which most assuredly is a certain remedy, but, from the consumption of the material, it is in a manner impracticable. The author recommends collecting together everything combustible about the farm—the cuttings of hedges, the clearings of ditches, &c., together with what straw can be spared (?); these are to be strewed over the land, and burnt on the ground, a few hours or so before the seed is put into it. The material we got for this purpose by raking off the old wheat-stubble from the young clover plant, such being the practice of cropping. Two ridges (called acres) were selected for this roasting—the process much resembles our practice of burning a fat pig for bacon. That season was remarkable for the destructiveness of the fly, but the two ridges were untouched, they flourished amid the desolation of barrenness around them; and it was worthy of notice, as confirmatory of the effect upon the crop, that the half of the next ridge of land to windward was partially secured by the effect of the conflagration.

IMPORTANT TESTIMONIAL.

The author of this treatise is particularly indebted to William

Skirving, Esq., of Walton, for leave to insert the following letter, as also other most important information connected with the practical use of guano as a manure for all purposes; and to strangers visiting Liverpool, I recommend them to look over Mr. Skirving's farm, nursery-grounds, hot-houses, &c., which are not to be surpassed in any respect whatever throughout the United Kingdom :—

Walton Nursery,

Near Liverpool, 15th Feb., 1844.

SIR,—I beg to acknowledge your letter of the 12th instant, and in answer to your question respecting the durability of guano as a manure, I have great pleasure in giving you my opinion, which is founded on experiments with the guano I have had from your house during the last three years. I am now thoroughly convinced that guano is not only a most valuable manure for the first crop, but for crops for years after, according to the quantity at first applied.

I have noticed minutely the effect of guano on the crops for three successive years, where it was first applied at the rate of 4 cwt. to the acre. The first crop was grass, the second turnips, the third oats, and every year each of those crops were excellent and decidedly better than when I applied 20 tons of farm-yard manure to the same quantity of land adjoining. There is, therefore, no longer any doubt in my mind about the lasting qualities of genuine guano as a manure, where it is properly applied for permanent purposes, nor can there be any doubt of its being the cheapest manure we know of; for in the experiments I allude to the guano cost £2 8s., the farm-yard manure £10,—ten shillings per ton being the common price for the best horse and cow dung here in the spring time.

In this neighbourhood a great deal of guano has been used for top-dressing grass land at the rate of 2 cwt. to the acre, and in all cases that I have heard of, it has given very great crops the first year; but some of the parties who have used it in this way, complain that they did not see much improvement in the crop the second year. I should have been very much surprised if they had, for I have many times seen £5 worth of farm-yard dung applied as a top-dressing to an acre, and never could see any advantage of it after the first year. If people want manure to have a permanent effect, let them bury it in the land, and they will have the benefit for years; but if they take and scatter it to the sun and wind, with-

out digging it in, they will never see its effects after the first crop.

I continue to use guano to crops of all kinds on my farm or garden, and in my nursery grounds, and in a liquid state I have used it in my hothouses and greenhouses, to plants of every kind with great benefit to all.

In market gardens and kitchen gardens of any kind, I consider guano invaluable; for by proper application of the liquid in the spring months, you not only double the quantity of many crops, but with such as rhubarb, sea-kale, asparagus, &c., you get them much earlier, which is a double advantage. In short, in all the departments of my business, whether the farm or the nursery, guano seems now indispensable. Whenever we see a crop not thriving, we apply guano the first *wet* day afterwards, and if the crop is not too far advanced, it generally has a very good effect.

Manure is the mainspring in all farming or gardening operations; without plenty of it our labour is in vain. We may drain well, subsoil, plough or dig deep, but without abundance of manure, land can no more be *profitably* worked than a horse can that is half fed.

With the assistance of guano, I had plenty of grass to mow last year from the first week in April until the first week in December, besides a good bite for after-grass for grazing. To conclude, I beg to state, as my opinion, that the discovery of guano is by far the most important of the age, either for agriculture or horticulture, and I for one feel particularly indebted to you for its introduction into England.—I am, your most obedient Servant,

WM. SKIRVING.

To Messrs. Gibbs and Co.

EARLY SWEDES AND TURNIP CROP.

It is highly important, in the absence of rain, and so long continued drought as the present time, that a substitute should be found to enable the farmer to proceed with his turnip crops.

The author of this treatise begs to submit, with all due submission, to the agriculturists generally, that a common water-cart should be engaged to convey to the field farm-yard drainings, guano liquid, or water, to be applied immediately on the summit of the turnip ridges after the seed is deposited in the ground, so as to supply sufficient moisture to cause germination to take place as early as possible.

The securing of an early turnip crop is highly pregnant with many advantages, the first and not the least affording food for the cattle during the winter season, and also forms the basis of all following crops in rotation. In this case I beg to suggest, that if turnips were sown by the drill, in ridges, or in any other manner, the following plan might be adopted on a small scale this season, by common large garden watering-pans, and that either *very early in the morning*, or not until 5 *p.m.*, in order that the power of the sun should not exhale or deprive the turnip plant of the advantages of moisture thus afforded by temporary application of farm-yard drainings, or otherways.

Rain, or common pond or river water (*not spring water, if any other can be procured*), at the rate of 3 cwt. of guano per statute acre, mixed in the proportion of 7 lbs. of guano to 20 gallons of the liquid, which should remain 24 hours before being applied to the earth; this, if properly attended to, would ensure, in all dry seasons, a good crop of turnips (or mangel wurzel), a supply of liquid to be placed in tubs at the head of every land, and sufficient assistance to replenish the watering-pans as required. If this could be found practicable, it would remunerate the farmer with four times its cost of application; and I most strongly recommend a trial of the above experiment on a small scale immediately, to be convinced of its beneficial result. In addition to the above, where gypsum of genuine quality can be procured at a moderate rate, I strongly recommend it to be applied in the proportion of 4 cwt. per acre by hand on the ridges of the land. As soon as the plant appears above the surface, it will not only *deter the fly*, but collect as much atmospheric air during the night as will supply the turnip plant with water during the day following.

The important value of *genuine gypsum* is not generally known; but in the former case, as well as the present with *guano*, a great quantity of a spurious quality has found its way in all directions of the United Kingdom; and the author, if applied to, will secure the agriculturist for the future against any further loss or disappointment in the use and value of guano and gypsum as manures.

It is also practicable to produce a water-cart similar in construction to those applied in London and cities and towns for watering the roads and streets at much less expense, to be drawn by a pony; or, which would be preferable to a heavy horse, on account of the

imprint of his foot on the land, the tube or barrel might be so arranged as to convey the water to four ridges at one time, and, if required for meadow land, a barrel to be supplied, perforated all the length of the tube. This can be carried into effect, if required, at no great expense; and, in dry weather, after hay is removed from the field in the summer season, would be of incalculable value to the grazier, by applying guano water in producing the after-math, or grass, at any season of the year, or in the event of any crop suffering for want of moisture, but more particularly for turnips. And any other crops where the corn or seed is sown broadcast, if the plan alluded to above is only once carried into effect, I am certain the advantages produced therefrom would soon become general.

MODE OF TESTING THE QUALITY OF GUANO.

Good Guano is the excrement of sea-fowl, accumulating in countries where there is no rain. It owes its virtue, as a manure, first, to the presence of ammoniacal salts, and, secondly, to that of the phosphate of lime, or bone earth, derived from the bones of fish. To test for the ammonia, take a spoonful of guano and a spoonful of powdered quick lime, put them in a mortar and rub them with the pestle for a few seconds. If the guano be genuine, the smell will resemble that of a bottle of salts, and will make the eyes water in the same manner. In this way it may be proved whether the sample be guano or not, and also the strength of different samples may be estimated by the comparative strength of effluvia of the ammonia disengaged. To test for the phosphate of lime, place a small quantity (say 100 grains) in an iron ladle, or earthen pipkin, or any similar vessel, in which heat it red hot over a clear fire for twenty minutes. If the guano be genuine, it will be reduced to a white ash, weighing about 35 grains. If the 100 grains, when burned, weigh much more than 35, the guano is not genuine, or contains an undue proportion of sand or similar matter. The ashes from genuine guano will be found to be phosphate of lime, nearly pure. If it be required to prove this, a small bottle of acetic acid or white vinegar will dissolve the phosphate, and hold it in solution, leaving the silica and alumina (probably amounting to three or four grains) undissolved. The ashes should be left in the acetic acid for two days, and the bottle occasionally shaken. It is assumed that the guano to be tested be dry.—*Farmers' Journal*.

G Y P S U M,

OR THE REAL SULPHATE OF LIME,

Is considered, by all scientific chemists and agriculturists, a most powerful agent, combined with guano, as a manure. It possesses a great proportion of sulphuric acid. In the first place, the lime contained therein has the extraordinary property of warming the earth, and therefore must naturally be productive to the plant, especially as *the acid contained therein* is one that has a strong affinity for humidity, so much so that in the hottest day in summer it will deprive the atmosphere of its hydrogen (or moisture); therefore the acid absorbing the moisture from the atmosphere, in connection with the sulphate of lime, must undoubtedly add materially to vegetation, as the roots not only receive the warmth from the sulphate of lime, but the moisture absorbed by the acid from the atmosphere, and by this means has the effect of a warm sun and cooling shower, which is received at the roots of the plants, not only by day, but especially by night.

In addition to the advantages of genuine gypsum, applied with guano, already particularly recommended in this treatise, I beg to quote an extraordinary instance of its effects, on its first introduction into Norfolk, in 1816. When I was attending Mr. Coke's (the late lamented patriarch of the soil) sheep shearing, at Holkham House, and conversing with him in the park, he complained to me that a portion of his estate, near Wells (about six miles distant), was a very light sandy land; and, although he treated it in every respect like the rest of his farm, with plenty of manure, he was unable to produce more than six or eight bushels of corn per acre. I recommended him to apply gypsum, and he desired me to forward him *ten tons*, as a trial. When I again called upon him (three years after), he said, the land before mentioned, *by the application of gypsum*, instead of producing six to eight bushels of grain per acre, averaged 8 quarters American barley, 8½ quarters of Chevalier barley, and 5 quarters wheat, per statute acre.

I beg further to observe, that gypsum, applied upon light or blow-away sands, with a good top-dressing of the same afterwards, turned over and repeated with the same quantity twice or three times, well ploughed and harrowed in, causes a body and consequent adherence to the soil, which forms a basis or ground-work, so that it ultimately retains all effects of manures or composts bestowed upon it, which, previous to the above remedy, was liable, in consequence of the land being so light and porous after a heavy fall of rain, to be washed into the bowels of the earth, without the least possible benefit to the land to which it was applied. I can only repeat, that the application of gypsum to sand-land, particularly if of genuine quality, and systematically worked into the land, would prove the greatest benefit to the agriculturist.

My Second Edition will treat more fully on the extraordinary powers of gypsum, not only in combination with guano, but its benefits to light soils in general ; to the latter only is its application recommended.

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